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If doubly refracting media are used as plates, two sets of bands are seen superimposed, which are easily shown to be due to the ordinary and extraordinary rays respectively. But for some of these crystals the data are as yet insufficient to give more than a general accordance with theory.

The method might be applied practically for determining the indices of many substances to which the ordinary method is inapplicable from the impossibility of forming them into prisms: n will also exhibit palpably the most insensible degree of double refraction, and may thus become useful to the mineralogist.

There is a close analogy between these phenomena and those observed by Baron von Wrede, and by Sir D. Brewster and Mr. Fox Talbot, of which Mr. Airy has given a theory. A similar theory is necessary for explaining some of the more minute details of the present phenomena; and on this subject some extensive researches have been pursued by Mr. Stokes of Pembroke College, Cambridge, which will soon appear.

“On the Meteorology of the Lake District of Cumberland and Westmoreland.” By John Fletcher Miller, Esq. Communicated by Lieut.-Col. Sabine, R.A., For. Sec. R.S.

The author has devoted nearly four years to the investigation of the quantities of rain falling in the lake districts of Cumberland and Westmoreland; and he commenced, two years ago, a set of experiments specially directed to ascertain the amount of rain deposited at great elevations above the sea, such as the summits of our highest English mountains. As the investigation proceeded, some remarkable results were obtained, which coming to the knowledge of the Royal Society early in last year (1847), the Council contributed a sum of money from the Donation Fund towards the current expenses attending this inquiry, of which the results are given in the present communication, comprising extensive tables of observations relative to the quantity of rain in different situations within the above period of time.

May 25, 1848.

The MARQUIS OF NORTHAMPTON, President, in the Chair.

“On the structure of the Jaws and Teeth of the Iguanodon.” By Gideon Algernon Mantell, Esq., LL.D., F.R.S., Vice-President of the Geological Society, &c.

The recent discovery of the right dentary bone of the lower jaw of an adult Iguanodon with teeth, having enabled the author, with the aid afforded by other specimens, to determine the structure of the maxillary organs of that gigantic herbivorous reptile, the result of his investigations are embodied in the present communication.

The first memoir of the author on the teeth of the Iguanodon was published in the Philosophical Transactions for 1825; but owing

to the fragmentary and water-worn condition in which the fossil remains of terrestrial vertebrated animals occur in fluvial deposits, in consequence of these strata consisting of materials transported from far-distant lands, nearly a quarter of a century elapsed before any portion of the jaw with teeth was discovered.

The most important of the fossils described in this memoir consists of the anterior part of the right side of the lower jaw, which was discovered a few weeks since, in a quarry in Tilgate Forest, by Capt. Lambart Brickenden, F.G.S., who with great liberality placed it at the disposal of the author as the original investigator of the fossils of the Wealden.

This dentary bone, which is eighteen inches long, is perfect in the anterior part, but is broken at the hinder extremity, and retains five or six inches of the coronoid bone: the length of the jaw to which it belonged is estimated at four feet. It contains two successional teeth in place, the fang of a third, and the alveoli or sockets for eighteen or nineteen mature molars; the entire number of teeth on each side the lower jaw was about twenty.

The mature teeth, which, when abraded by use in mastication, resemble the worn molars of herbivorous mammalia, appear to have been arranged in a close-set series. The lower teeth had their enamelled striated face parallel with the alveolar plate, and fronting the inside of the mouth; but the upper were placed in a reverse position, that is, with the enamelled facet of the crown external; and the teeth in the upper and lower jaws were arranged subalternate or intermediate in relation to each other, as is the case in the ruminants.

But a still more remarkable character presented by this specimen is the peculiar construction of the anterior part of the lower jaw, which forms the symphysis. This process, instead of being continued round the front of the mouth and beset with teeth, as in all other saurians, is edentulous, and extends into a procumbent scoop-like expansion, very analogous to the symphyseal portion of the lower jaw in the Sloths, and especially to that of the colossal extinct *Edentata*—the *Mylodons*. Along the external surface of this dentary bone there is a row of very large vascular foramina; and the symphysis also is perforated with numerous openings for the passage of blood-vessels and nerves sent off from the great dental canal. The unusual number and magnitude of these foramina indicate a great development of the integuments and soft parts with which the bone was invested, and also the large size of the under lip.

The upper jaw, of which a considerable portion discovered by the author is in the British Museum, confirms the inferences deduced from the teeth and dentary bone of the lower maxilla.

The author, with the able assistance of Dr. A. G. Melville, instituted a comparison between all the teeth of the *Iguanodon* to which he could obtain access, and those of recent saurians; and the result of the investigation is detailed. The new light shed on the structure and functions of the dental organs, confirms, in every essential particular, the inferences deduced by the author from the detached teeth alone, in his memoir of 1825; and it also reveals an extraordinary devia-

tion from all known types of reptilian organization, and which could not have been predicated; namely, that this colossal reptile, which equalled in bulk the gigantic Edentata of South America, and like them was destined to obtain support from comminuted vegetable substances, was also furnished with a large prehensile tongue and fleshy lips, to serve as instruments for seizing and cropping the foliage and branches of trees; while the arrangement of the teeth as in the ruminants, and their internal structure, which resembles that of the molars of the Sloth tribe in the vascularity of the dentine, indicate adaptations for the same purpose.

Among the physiological phenomena revealed by Palæontology, there is not a more remarkable one than this modification of the type of organization peculiar to the class of reptiles, to meet the conditions required by the economy of a lizard placed under similar physical relations, and destined to effect the same general purpose in the scheme of nature, as the colossal Edentata of former ages, and the large herbivorous mammalia of our own times.

From the facts detailed, the author is led to consider the specimen described in his memoir of 1841, as being probably the lower jaw of a young *Iguanodon* (but the true nature of which, from the absence of the crowns of the teeth, was doubtful) belonging to the same family, but referable to a distinct genus or subgenus; and he proposes the name of *Regnosaurus Northamptoni* for that remarkable fossil saurian. The communication was illustrated by several drawings of the specimens described.

“An Account of some Observations made on the Depth of Rain which falls in the same Localities at different altitudes in the hilly districts of Lancashire, Cheshire and Derbyshire.” By S. C. Homersham, C.E. Communicated by George Newport, Esq., F.R.S. &c.

The author states, that having been present at a meeting of the Royal Society when a paper was read on the Meteorology of the Lake districts of Westmoreland and Cumberland, by J. Miller, Esq. of Kendal, in which it was stated that the quantity of rain falling in mountainous districts appears to increase from the valley upwards, to the altitude of about 2000 feet, and then rapidly to decrease, he wishes to lay before the Royal Society the results of his own observations, which lead him to a different conclusion. After stating that he had been at some trouble to analyse Mr. Miller's observations which have been communicated to him by that gentleman, he is of opinion that they do not warrant the conclusion deduced from them, and are also at variance with the recorded observations of Daines Barrington, Dr. Dalton, Professor Daniell and others, as well as those of Capt. Lefroy and Col. Sabine.

The author then shows from observations very carefully made in Lancashire, Cheshire and Derbyshire, from January 1846 to March 1848, that more rain falls at the bottom than at the tops of hills of a less elevation than 2000 feet in the same locality, and that the quantity diminishes in a ratio almost precisely corresponding to the height. The details are given in tables of monthly observations,